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INSPEC - 1969 to date (INZZ)

#### Accession number & update

3292214, A89019809, B89008069; 890000.

**Title** 

Production of high-quality amorphous silicon films by evaporative silane surface decomposition.

# Author(s)

Doyle-R; Robertson-R; Lin-G-H; He-M-Z; Gallagher-A.

# **Author affiliation**

Joint Inst for Lab Astrophys, Colorado Univ, Boulder, CO, USA.

#### Source

Journal-of-Applied-Physics (USA), vol.64, no.6, p.3215-23, 15 Sept. 1988.

# **CODEN**

JAPIAU.

#### **ISSN**

ISSN: 0021-8979, CCCC: 0021-8979/88/183215-09 (\$02.40).

# Publication year

1988.

#### Language

EN.

# **Publication type**

J Journal Paper.

#### **Treatment codes**

X Experimental.

### **Abstract**

High-quality hydrogenated amorphous silicon films (a-Si:H) have been produced by decomposition of low-pressure silane gas on a very hot surface with deposition of low-pressure silane gas on a very hot surface with deposition on a nearby, typically 210 degrees C substrate. A high-temperature tungsten filament provides the surface for heterogeneous thermal decomposition of the low-pressure silane and subsequent evaporation of atomic silicon and hydrogen. These evaporated species (primarily) induce a-Si:H growth on nearby substrates which are temperature controlled using a novel substrate holder. The light and dark conductivities, optical band gap, deposition rates, and light-soaking effects of preliminary films are reported. The decomposition-evaporation process has been examined using a mass spectrometer to directly detect the decomposition rate and the evaporated radical species. Based on this data and other information, a simplified model for the deposition process is suggested. The excellent film quality and the attributes of the deposition process make this technique, which was originally suggested by Wiessman, viable for the fast rate, large-area

deposition of a-Si:H for solar cells and other applications. (35 refs).

#### **Descriptors**

<u>amorphous-semiconductors</u>; <u>CVD-coatings</u>; <u>dissociation</u>; <u>elemental-semiconductors</u>; <u>energy-gap</u>; <u>hydrogen</u>; <u>semiconductor-thin-films</u>; <u>silicon</u>.

#### **Keywords**

semiconductor; CVD; low pressure **silane** gas; low pressure **silane** gas; thermal decomposition; optical band gap; deposition rates; light soaking effects; decomposition evaporation process; mass spectrometer; **film** quality; solar cells; **amorphous** Si:H.

#### Classification codes

A8115H	(Chemical vapour deposition).
A6855	(Thin film growth, structure, and epitaxy).
A7360F	(Semiconductor films).
B0520F	(Vapour deposition).
B2520F	(Amorphous and glassy semiconductors).

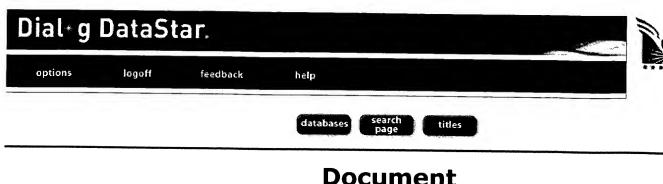
# **Chemical indexing**

Si:H int, Si int, H int, Si:H bin, Si bin, H bin, Si el, H el, H dop.

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INSPEC - 1969 to date (INZZ)

# Accession number & update

4775689, B9411-2560R-042; 941006.

**Title** 

Inverse-staggered polycrystalline silicon thin-film transistors fabricated by excimer laser irradiation. Author(s)

Ono-K; Ogawa-K; Sakuta-H; Konishi-N.

### Author affiliation

Hitachi Res Lab, Hitachi Ltd, Japan.

### **Source**

Electronics-and-Communications-in-Japan-Part-2 (Electronics)(USA), vol.76, no.12, p.40-7, Dec. 1993.

#### CODEN

ECJEEJ.

#### **ISSN**

ISSN: 8756-663X, CCCC: 8756-663X/93/0012-0040.

# Publication year

1993.

#### Language

EN.

# **Publication type**

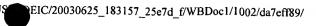
J Journal Paper.

#### **Treatment codes**

X Experimental.

### **Abstract**

Fundamental device performance, mobility distribution, and threshold voltage shift characteristics of inverted staggered polycrystalline thin-film transistors (TFTs) are discussed. The present TFT uses a polycrystalline silicon (p-Si) crystallized by excimer laser as semiconductor layer and SiN prepared by CVD method as gate insulator. The TFT was fabricated onto glass substrate of 100 mm/sup 2/ at a maximum temperature of 300 degrees C. Measurements of the distribution of mobility were carried out with devices placed at every 0.3 mm pitch. As a result, the mobility mu of TFT made at laser intensity of 200 mJ/cm/sup 2/ is 20.9 cm/sup 2//V.s and the off-current is 2\*10/sup 11/A. TFT was found to be very uniform except for a region where a superposition of 200 mJ/cm/sup 2/ laser irradiation over a weak laser intensity was made. The analysis indicates that the region for low micrometer is the area irradiated by a laser intensity 110 to 170 mJ /cm/sup 2/. The region irradiated with laser intensity of this range also was found to be in a mixed state of amorphous silicon of



depleted hydrogen atoms and crystalline consisting of fine grains. A shift voltage at 20 V gate DC voltage at 10/sup 4/ s after the application of the voltage is 0.2 V, 1/25 time smaller compared to a-Si TFT. The present p-Si TFT is demonstrated to exhibit high-device performance for liquid crystal display. (19 refs).

### **Descriptors**

<u>chemical-vapour-deposition; elemental-semiconductors; excimer-lasers; laser-beam-applications; liquid-crystal-displays; silicon; thin-film-transistors.</u>

#### Keywords

**inverse staggered** polycrystalline silicon TFT; thin film transistors; excimer laser irradiation; fundamental device performance; mobility distribution; threshold voltage shift; semiconductor layer; SiN gate insulator; CVD method; glass substrate; weak laser intensity; low micrometer; mixed state; amorphous silicon; depleted hydrogen atoms; crystalline fine grain Si; p Si TFT; device performance; liquid crystal display; 300 C; 20 V; 0.2 V; Si SiN.

#### Classification codes

B2560R	(Insulated gate field effect transistors).
B4150D	(Liquid crystal devices).
B2520C	(Elemental semiconductors).
B4360	(Laser applications).

#### Chemical indexing

Si-SiN int, SiN int, Si int, N int, SiN bin, Si bin, N bin, Si el.

# **Numerical indexing**

temperature: 5.73E+02 K; voltage: 2.0E+01 V, 2.0E-01 V.

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